



# **HORIZONTAL TECHNICAL INSERTION OF MISSILE AND GUN TECHNOLOGIES**

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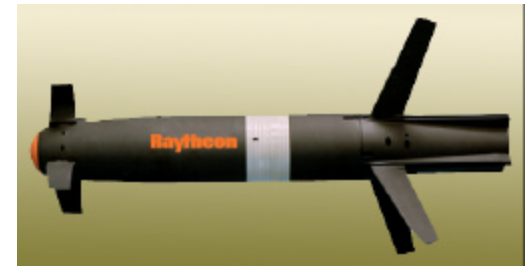
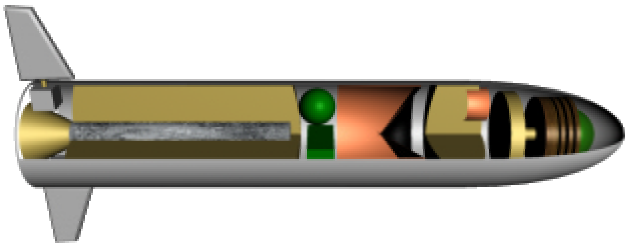
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# TRENDS

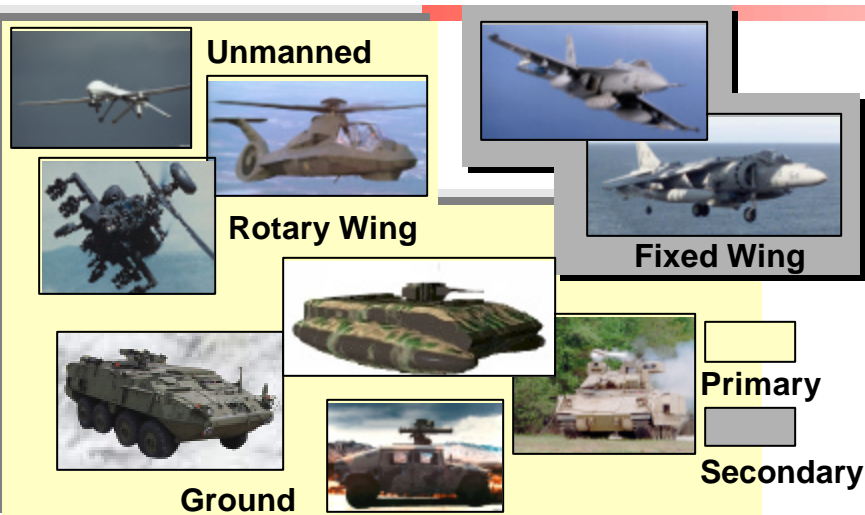
- SOPHISTICATED TECHNOLOGY IS BEING INTEGRATED INTO ALL MUNITIONS
- MISSILES
  - “FIRE AND FORGET” IS SUPPLEMENTING “MAN IN THE LOOP”
  - PLATFORM TECHNOLOGY IS BEING PUSHED INTO TACTICAL MISSILES
- PROJECTILES
  - PRECISION FIRES ARE REPLACING MASSED FIRES
  - MISSILE TECHNOLOGY IS BEING LEVERAGED BY PRECISION PROJECTILES





# FUTURE MISSILE OVERVIEW

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## DESCRIPTION

- Employable on a Variety of Air and Ground Platforms
- Common components
- Multi-mode Seeker
- Multi-mode Warhead
- Increased Stand-off Range

## BENEFITS / CAPABILITIES

- Focus on Army Objective Force
  - - Provides Line of Sight (LOS), Non LOS, & Beyond LOS Capability
- Common/shared components among missile variants to reduce development
- Linked to the Tactical Net

## KEY PERFORMANCE PARAMETERS

- Fire and Forget
- Man In The Loop (see the target)
- Higher  $P_k$
- Longer Range
- Ease of Platform Compatibility



# FCS Multi-Role Armament & Ammunition (MRAAS)

## DESCRIPTION

- Common components
- Multi-mode Seeker
- Multi-mode Warhead
- Increased Stand-off Range

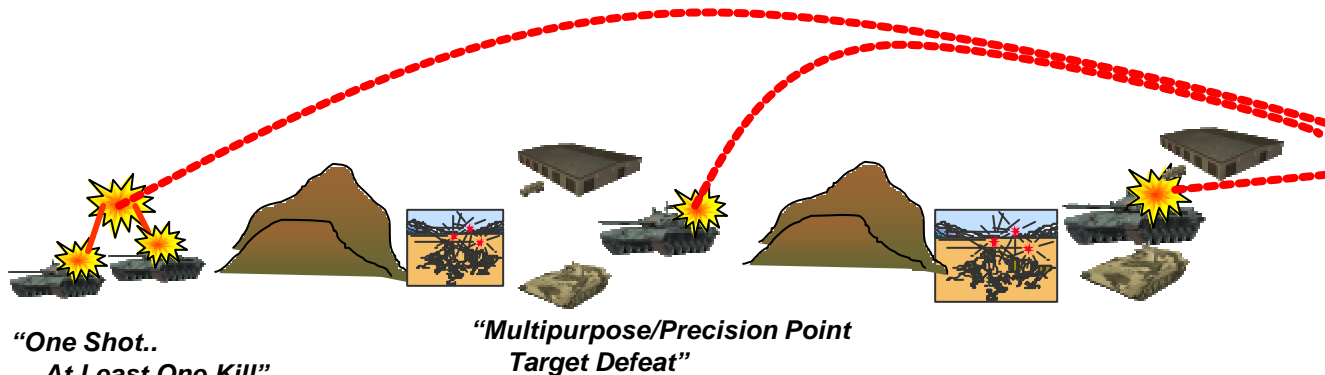
## KEY PERFORMANCE PARAMETERS

- Fire and Forget
- Higher  $P_k$
- Longer Range

**NLOS 4-50KM**

**BLOS 2-12km**

**LOS 0-4Km**



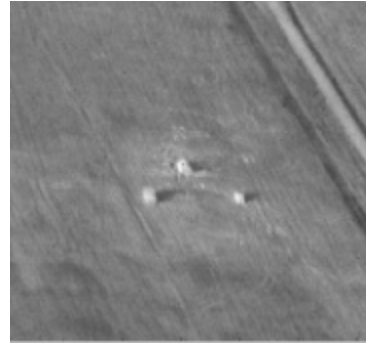
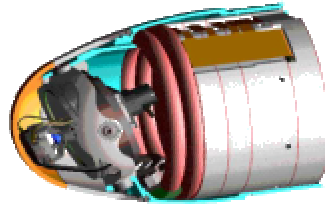
**With Similar KPP's and Components, Missiles And Precision Projectiles Will Reinforce Each Other on the Future Battlefield**



# COMMON SEEKER COMPONENTS

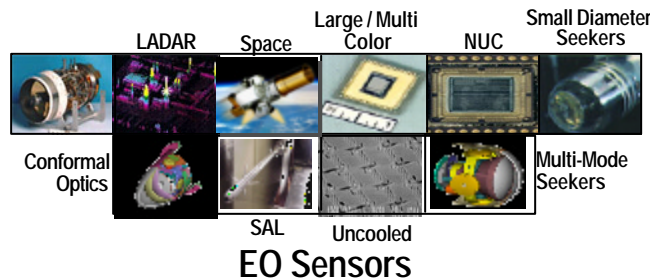
## MISSILE

- LASER DETECTION (PAVEWAY)
- IR IMAGERY (JAVELIN)
- RADAR (HARM)
- LADAR (FUTURE)



## PROJECTILE

- LASER DETECTION (COPPERHEAD)
- IR IMAGERY (TERM, MRM)
- RADAR (SADARM, MRAAS)
- LADAR (MRAAS)



**All Types of Electro Optical and Radar Seeker Technology Are Transitioning From Missiles to Projectiles**



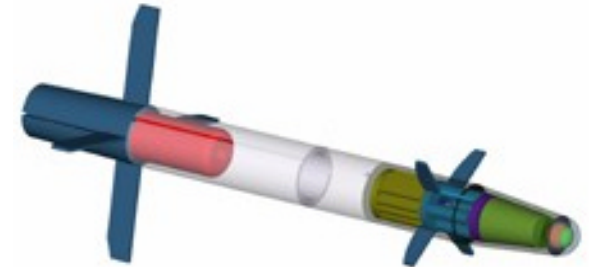
# Seeker and Software Commonality



Multimode  
Missile Seeker

## Commonality

- Similar sensors and integration
- Designs leveraged
- Similar software
- Spiral development

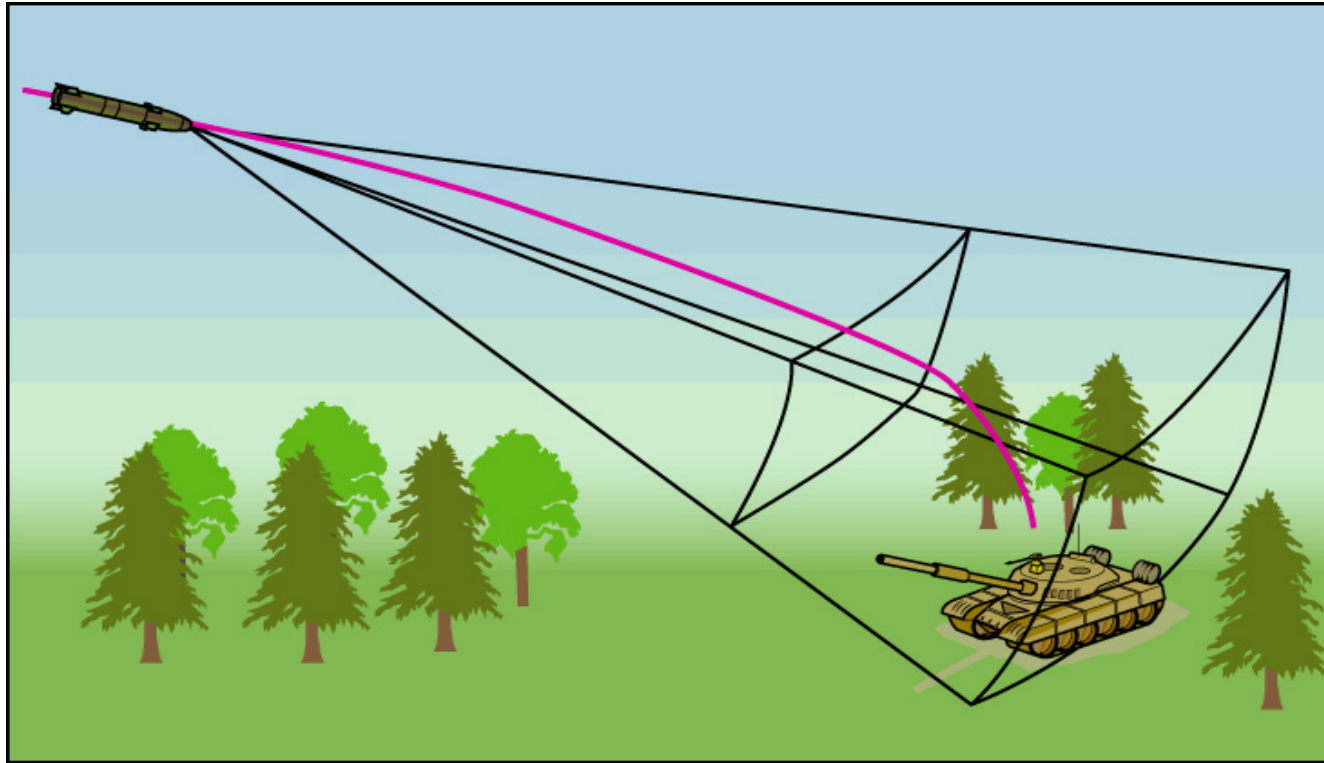


Multimode projectile Seeker

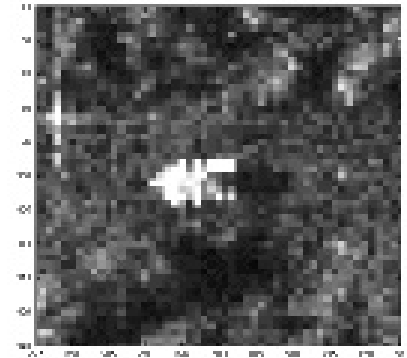
**Reuse of Software and Technology make future systems affordable**



# MULTI-MODE SEEKER CONCEPT



Radar



Imaging Infrared:



**Multi-mode Seekers in Precision Projectiles Will Create the Next Leap in Precision Technology**

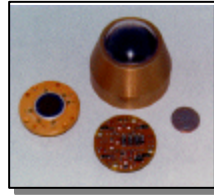


# LASER GUIDED MUNITIONS LEGACY AND FUTURE

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2.75 INCH LASER SEEKER



PROJECTILE  
GUN HARDENING



TERM

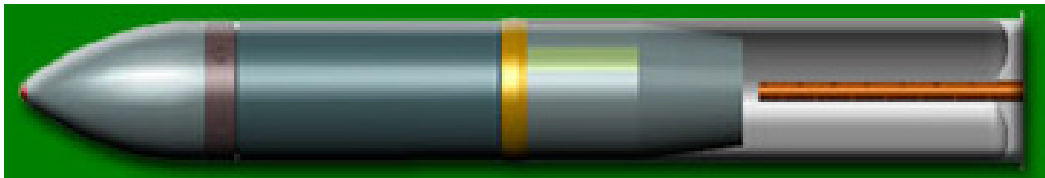
## COMMON HARDWARE

- ELECTRONICS DESIGN
- DETECTOR
- CAS
- WARHEAD CONCEPT
- FUZING

## COMMON SOFTWARE

- SAL TRACKER
- CCM
- GUIDANCE
- 6 DOF

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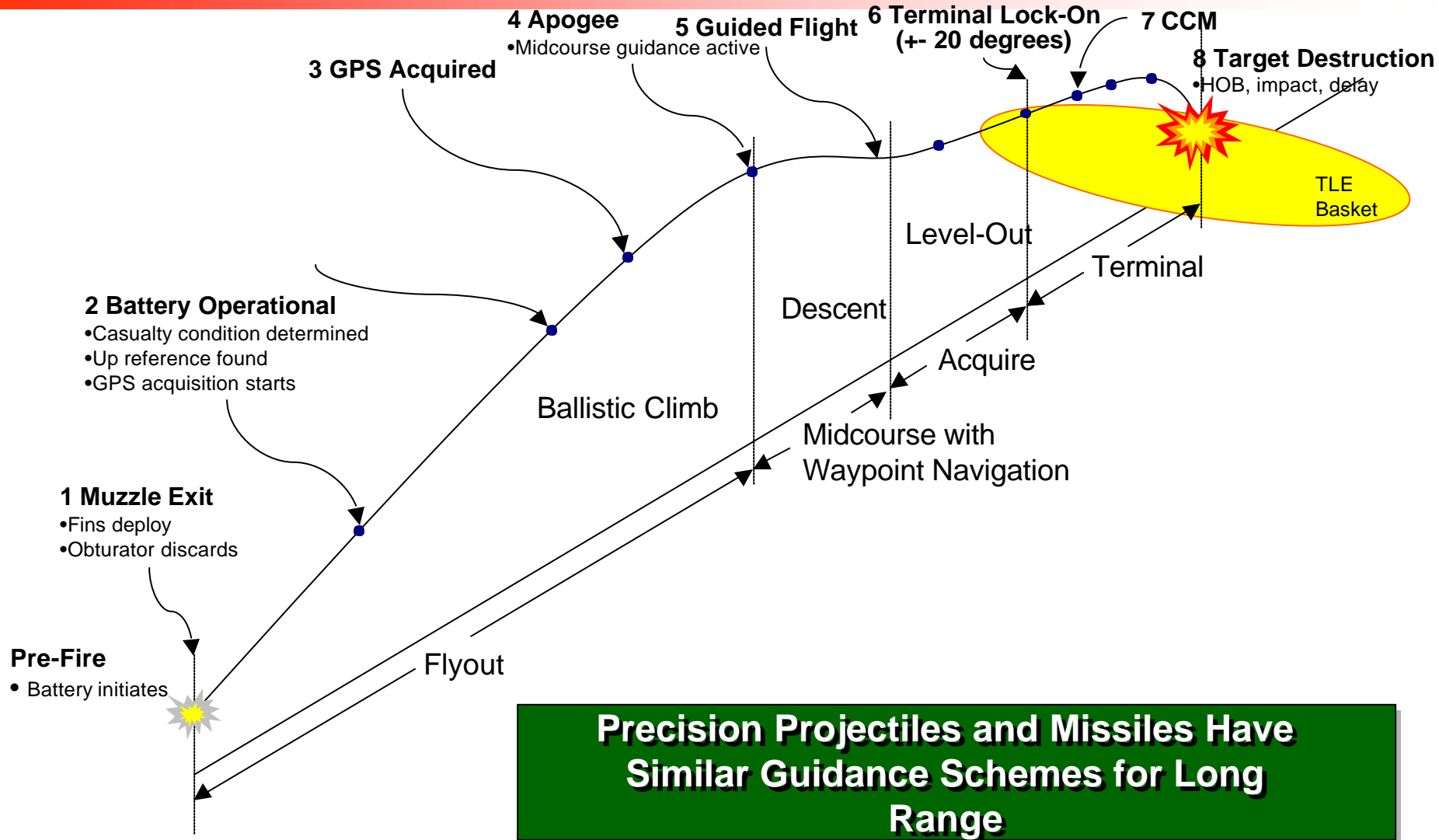


LASER GUIDED MUNITIONS FOR FCS MRAAS, 105MM CANNON AND MORTARS ARE IN THE FUTURE





# TYPICAL PRECISION TRAJECTORY





# COURSE CORRECTION GUIDANCE

## MISSILE

- DIVERT THRUSTERS
  - DRAGON
  - LOSAT



## PROJECTILE

- GUIDED KE FOR FCS
- PRECISION GUIDED MORTAR

## ADVANTAGES

INEXPENSIVE

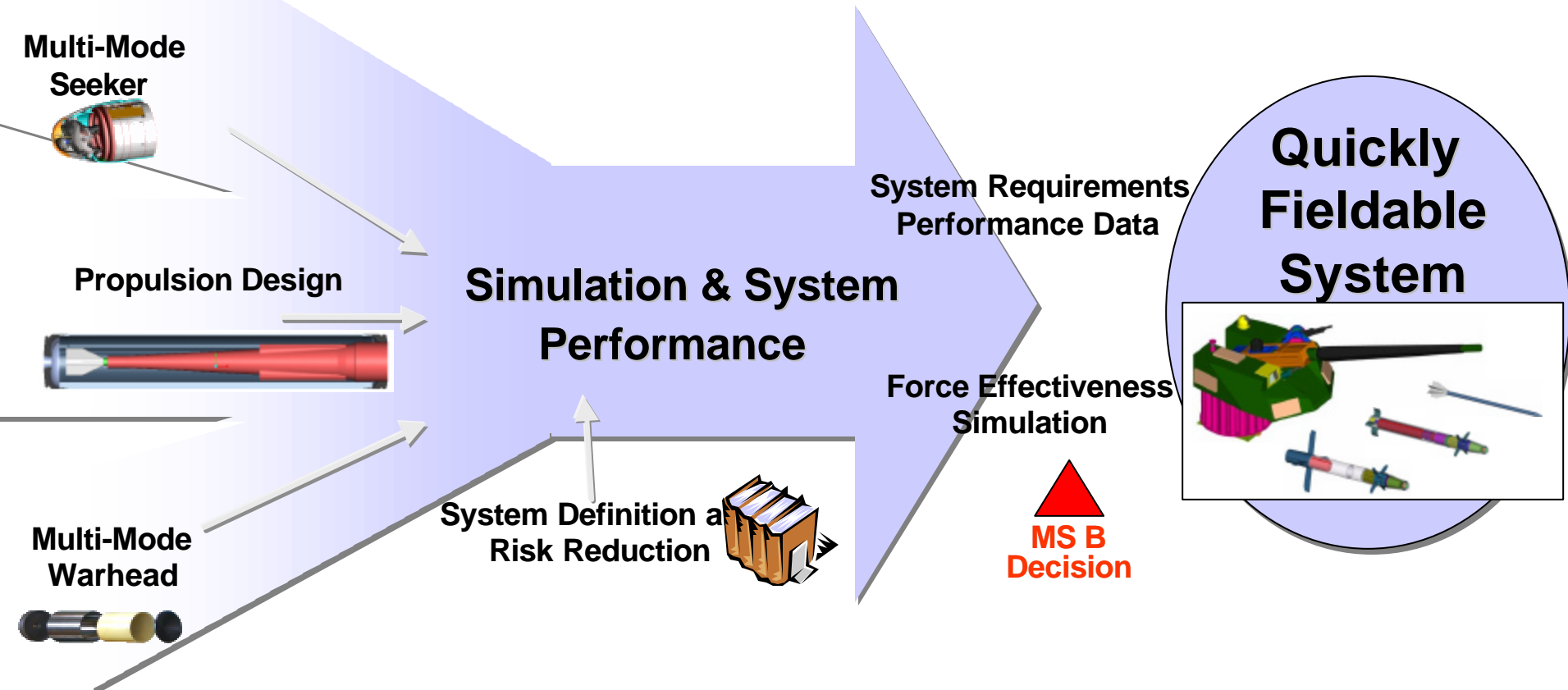
FUNCTION AT HIGH SPEEDS

INCREASED LONG RANGE ACCURACY

**Technology Developed for Control of Super Sonic Missiles Can Be Miniaturized for Projectile Guidance**



# SIMULATION TECHNOLOGY FOR PRECISION MUNITIONS DEVELOPMENT

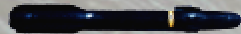


**Simulation Now Used to Reduce Cost of Missile Development Will  
Also Reduce the Cost of Precision Projectile Development**

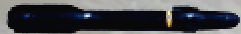


# COMMON MISSILE TRANSFORMATION STRATEGY

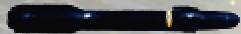
## NEAR-TERM



BASIC HELLFIRE



INTERIM HELLFIRE



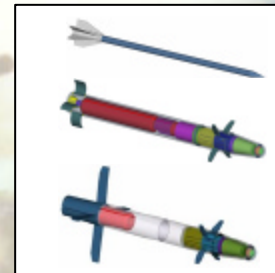
HELLFIRE II

## BLOCK I



## BLOCK II

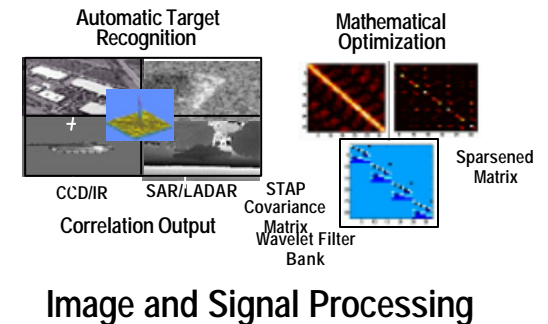
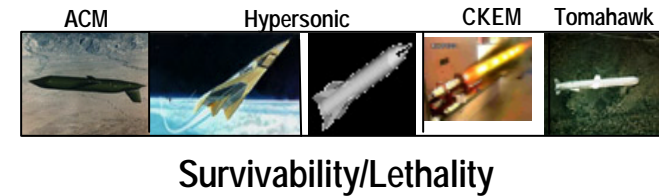
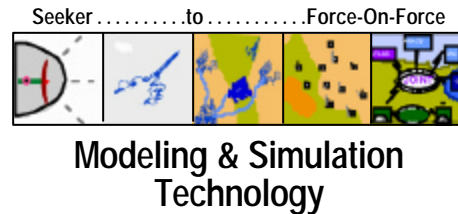
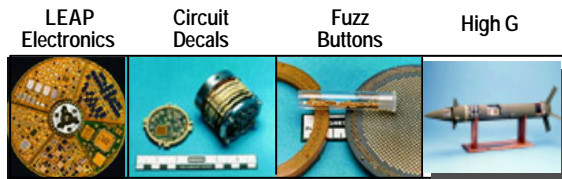
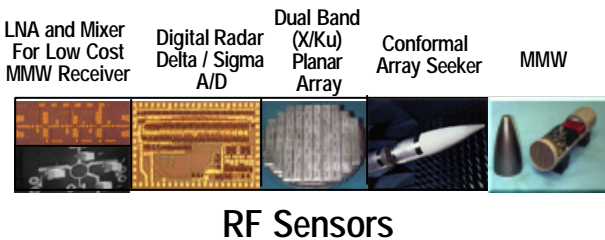
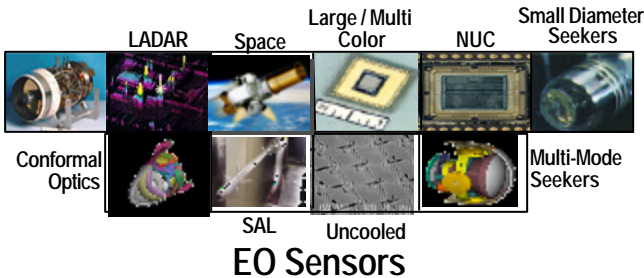
- EVOLUTIONARY ACQUISITION
- TIME-PHASED REQUIREMENTS
- INCREASED INCREMENTS OF CAPABILITY
- MATCH PROJECTED THREAT



**Block Acquisition Strategy Used to Reduce Precision Munition  
Fielding Risks**



# Technical Leverage for Precision Munitions



**Numerous Missile Technologies are Available for Future Precision Munitions**



# SUMMARY

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- Industry is emphasizing technical insertion, reuse and commonality in all our products
  - Reduced Development Costs
  - Reduced Production Costs
  - Shortened Development Cycles
- Missile programs are now beginning to benefit from projectile technologies
- Next generation precision projectiles will benefit from a fast-paced, spiral development cycle

**Missile/Projectile Horizontal Integration Will Continue to Expand  
with Dramatic Benefits to the Armed Forces!**